HOSPITAL SHIPS

PLANS AND DESCRIPTION OF A HOSPITAL SHIP FOR THE UNITED STATES NAVY.[1]

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In presenting plans for a hospital ship for the United States Navy, I desire to make some general remarks before entering into the details of the plans.

There never has been a hospital ship built up from the keel for the purpose of treating, caring for, and transporting the sick and wounded; consequently, there never has been a satisfactory, up-to-date, properly constructed hospital ship, and there never will be one until it is planned, designed, and built up from the keel by experienced naval constructors and engineers, advised and assisted by medical officers of experience with hospitals and hospital ships and skilled in practical hygiene. All hospital ships up to the present time have been merchant ships or cruisers converted into floating hospitals, and they have been unsatisfactory, as it is more impracticable to convert a merchant ship into a satisfactory, up-to-date hospital ship than

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1912

it is to convert an ordinary dwelling or factory into a modern, up-to-date hospital. Medical men are aware of how impracticable it is to convert an ordinary building into a properly appointed modern hospital. You can have just as good equipment in a dwelling or factory or on board a merchant ship, but it can not be installed, disposed of, or used to as good advantage as it can in a house or ship built for the special purpose of its reception, installation, and operation.

In building houses or ships sanitary precautions are not gone into so thoroughly as in hospitals and as they should be in hospital ships; and it is generally impracticable to correct these errors of sanitation so as to bring them up to the sanitary standards and requirements of modern hospitals and hospital ships. Converted hospital ships have done good work, and the sick are much more comfortable aboard them than aboard battleships or other cruising ships; but at best they are makeshifts, and the sick could be more easily, comfortably, and economically cared for aboard one that is properly designed and constructed.

To be satisfactory, convenient, comfortable, and economical, any building or ship must be designed and built with a special eye to the purpose for which it is intended, and these ends can not be attained by using a building or ship for purposes foreign to those for which it was intended. All hospital ships of the present day are merchant ships converted into floating hospitals at considerable time, expense, and labor; but, after all this, they are unsatisfactory, inconveniently arranged, hard to keep clean and sanitary, and far behind the sanitary requirements of modern times. To the casual visitor or observer aboard one of these ships these defects are not so apparent, but to one who has served aboard and has lived in daily combat with the problems of cleanliness, sanitation, the care, subsistence, treatment, and comfort of the sick and crew, these defects are very apparent, vivid, and realistic. Then, in converted merchant ships changes and alterations are continually being made in the vain effort to attain that end which can only be reached by building a proper hospital ship from the keel up. These never-ending changes and repairs are a constant source of expense, worry, and discomfort.

The difference in cost of running and keeping up a properly built hospital ship during its lifetime and a converted merchant ship would probably be enough to build an up-to-date hospital ship, not to speak of the increased comfort and convenience to all on board. In any ship, building, or institution the question of paramount importance is maintenance and not the first cost of building; therefore it behooves us to build a ship that can be run with the greatest economy and that requires the least expenditure for preservation and upkeep.

As hospital ships have well demonstrated their necessity and usefulness, it is safe to predict that the Navy will never be without them in the future, and therefore we should have satisfactory, properly constructed, and up-to-date ships. They would not go out of date or become obsolete in a few years and have to be sold for old junk or shot to pieces as our battleships are, but they would last for many years. The equipments might become old and out of date, but with good hulls, with proper internal arrangements for wards, berthing spaces, and other compartments these could be easily renewed and the ships kept up to date.

We should have at least two ships, one for each coast, of about 250 beds each, normal capacity, and which could be expanded in times of need to 400 or 500 beds for short periods. These ships would be base hospitals to accompany the fleets on the two coasts, and in time of war they could be supplemented by any required number of ambulance ships, which could be easily obtained from the merchant service. These ships as nuclei, with a sufficient number of ambulance ships, would meet all the exigencies in time of war. Of course it would be more satisfactory to have a greater number of hospital ships to care for the sick and wounded in time of war, but the expense of building and maintaining them for such an emergency would be practically prohibitive. We must consider the economical and practical sides of this question as well as the utilitarian side. When we consider the large amounts expended for military purposes and the difficulty of getting adequate appropriations for the building programs and running expenses of the Navy, it behooves us to proceed with caution in recommending large outlays. Many merchant ships are well adapted for transportation purposes, and if they are not they can, easily and in a very short time, be converted into ambulance ships for transporting the sick and wounded from the front or from foreign stations to the various hospitals in the United States. In times of peace they can be used for a great many different purposes, while hospital ships could only be used for one purpose, and all but one on each coast would probably be idle and of considerable expense to the Government for preservation and upkeep.

The most practical solution, then, of the question would be to have two good hospital ships of sufficient size, one for each coast, in time of peace and to supplement these in time of war by the required number of transports or ambulance ships with a few naval surgeons and Hospital Corps men on board, supplemented by volunteer medical officers and Hospital Corps men or Medical Reserve Corps officers and men. As the United States has rather extensive foreign possessions, it would probably be very desirable to have a medium-sized hospital ship for service in the Philippines and to visit at times other out-

lying possessions. It would be well to build one ship in the next year or two and another in the next five years. The knowledge among the enlisted personnel that when sick or wounded they would have the best of comforts, care, and treatment on board an up-to-date hospital ship would make them much more contented and also encourage men to enlist, reenlist, and remain in the service, to say nothing of the satisfaction and contentment of their relatives at home.

Hospital ships should be large and roomy, with plenty of air space in the wards and other living compartments, and ample deck space for exercise and recreation for the sick and the crew. They should be built with special considerations regarding sanitation, comfort, and convenience. Luxury is not a necessary adjunct, and it means increased expense, labor, and worry, makes proper sanitation harder to attain, and is generally conducive to negligence and inefficiency. Everything should be banished from a hospital ship that is not necessary for the comfort and contentment of the patients and crew. The workmanship should be plain and simple, with as few angles, corners, and ornamentations as possible to catch dirt and dust and harbor microbes and vermin. All parts should be accessible for cleaning and other sanitary purposes. All the fittings should be plain and simple and capable of being thoroughly cleaned and sterilized. There should be all sorts of labor-saving devices and machinery, so that the hospital corps and crew could be reduced to a minimum, thereby cutting down the running expenses as much as possible.

The wards should be high above the water, light and airy, with good natural and artificial ventilation and with convenient and easy communication with the rest of the ship. No ward should have to be used as a gangway or passageway to get from one part of the ship to another. There should be wide passages, gangways, elevators, stairways, and hatches to facilitate communication. The wards should be removed as far as practicable from the machinery spaces, so that the sick will not be disturbed by noises. The auxiliary machinery should, as far as practicable, be placed on the lower deck, amidship, around the fireroom and boiler-room uptakes, leaving the forward and after parts of the ship free for the sick. The administrative, executive, and working parts of the hospital department should be centrally located and closely connected to facilitate communication and thus obviate loss of time. Communication should be ample and easy between the various decks and between the different parts of the same deck. Great care should be exercised in installing apparatus in the various departments

In presenting these plans of a hospital ship for the United States Navy for consideration I do not desire to pose as an authority on the subject; but having served for nearly three years on a hospital ship, and having been in daily contact during that time with the

details and problems that continually confront one on board, I have learned many of the necessities and helped to solve many of the problems, and if I can add anything to the sum total of knowledge on the subject that will be of any use for medical officers of the Navy who will have to take up and continue the work, I shall feel amply repaid for the time, thought, work, and study I have given it. The first hospital ship to be built is not going to be perfect or all that is to be desired, as these ends can only be gained by long experience and practice, but it will be a great advance over the present hospital ships of the service in every way, and the second hospital ship will be better than the first on account of the knowledge and experience gained in building the first.

The plans here presented for consideration are far from being complete, as, not having been schooled in the sciences of naval construction and architecture and steam and electrical engineering, I am not competent to work out with any degree of accuracy the details necessary for the construction of a hospital ship. I have endeavored to give a general outline of the arrangements that should be in the hospital department of a ship and leave space enough for the installation of the engines, boilers, and auxiliary machinery, and then leave the working out of the details along these general lines to competent naval constructors and engineers. Having had a rather lengthy service on board a hospital ship, having met and battled with the various problems that arose and confronted me there, and having formulated many changes that were made on board for increasing the comfort, capacity, and efficiency of the ship, the knowledge and experience so gained has been of material value to me in planning and designing a hospital ship. These imperfect plans have been worked out after careful study of the various needs in active service with the Atlantic Fleet for nearly three years, aided by daily contact and experience with these necessities during that time.

It will require a great deal of thought, study, care, and work to install the proper apparatus, furniture, and equipment. Special designs should be worked out for certain apparatus, in order that they may be satisfactory. Every piece of equipment should be studied to ascertain whether it will meet all requirements. To this end, from the time the keel is laid until the ship is fully finished and equipped, it will require a corps of experts in the various departments to be constantly present to inspect the work and supervise the installation of the various machinery and equipment. Medical officers engaged in superintending this work should be fully informed in all that concerns the outfitting of the ship. To this end they should know the most modern methods and equipment in the various departments. They should visit the big hospitals, study their arrangements, equipment, and other features that might be of use.

They should go to the hotels in the large cities and the trans-Atlantic steamships and study the commissary and galley arrangements; then to the various factories, shops, and business houses and examine their apparatus, all the various types of which should be carefully gone into before final selection is made.

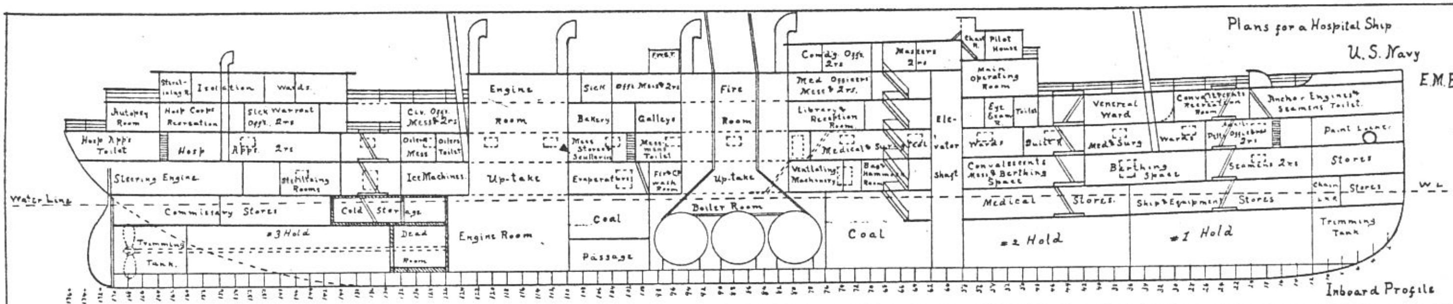
A system of vacuum cleaning should be installed throughout the vessel, and all parts of the ship should be connected by telephone. The dynamos should be sufficiently large to run the winches, anchor engines, and other auxiliary machinery, thus obviating the necessity of leading steam pipes about the ship and distributing wild heat. Very special attention should be given to the cold-storage plant. There should be all the necessary kinds of labor-saving machinery, and, as stated before, the ship should be built with a special eye to comfort, usefulness, and sanitation, and to this end the workmanship should be simple and substantial, all unnecessary ornamentation and luxuriousness being prohibited; but it should be equipped with everything necessary for the comfort, contentment, care, and treatment of the sick.

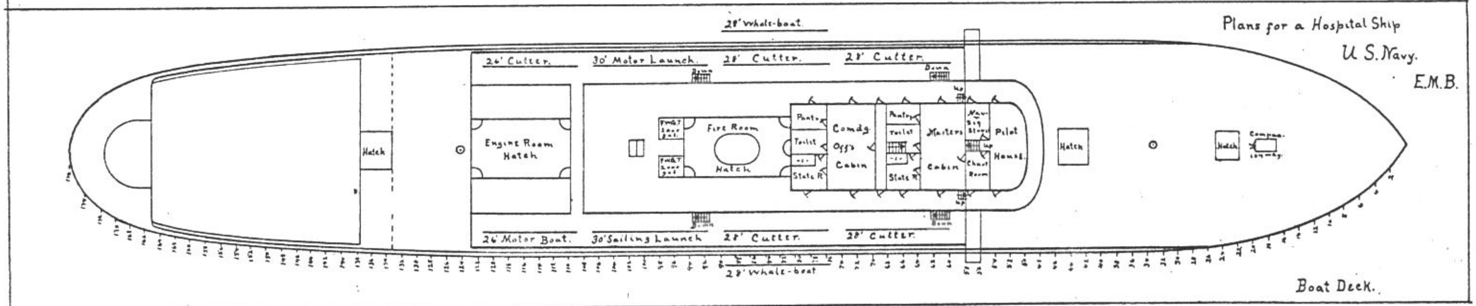
Before closing I desire to impress again upon you the futility of expecting to make a satisfactory hospital ship out of a merchant ship or obsolete cruiser. They can never be anything but makeshifts. As I have said before, the only possible way of getting a satisfactory hospital ship is to have it "built up from the keel by competent naval constructors and engineers, advised and assisted by medical officers of experience with hospitals, hospital ships, and skilled in practical hygiene."

To get the best results, you must have skilled workmen with special tools for the construction in hand and a special plant for carrying on this work. Hence to attain the end desired in caring for and treating the sick and wounded you must have the best doctors, modern and up-to-date equipments, hospitals, and hospital ships, and we should not be satisfied with anything less. The efficiency of the fighting forces depends in great measure upon the efficiency of the medical department, and the efficiency of the medical department depends, first, upon the personnel composing it, and, secondly, upon the facilities and equipment with which they are provided. Therefore, for the good of the Navy at large, it behooves all branches of the service to work together for these ends.

GENERAL DESCRIPTION OF SHIP.

In June, 1911, the writer submitted to the Bureau of Medicine and Surgery plans and description of a hospital ship of about 10,000 tons, 500 beds and extra berthing space for about 300 more patients, making a total of 800 besides the crew. These plans were made with


Plans for a Hospital Ship
U.S. Navy
E.M.B.
Inboard Profile
Water Line
W L
Isolation
Wards
Autopsy Room
Hosp Corps Recreation
Sick Warrant Offs. Qrs
Hosp App's Toilet
Hosp
App. Qrs
Steering Engine
Sterilizing Rooms
Commissary Stores
Cold Storage
#3 Hold
Trimming Tank.
Dead Room
Civ. Offs. Mess & Qrs.
Oilers Mess
Oilers Toilet
Ice Machines
Engine Room
Up-take
Engine Room
Sick
Offs Mess & Qrs
Bakery
Galleys
Mess Stores & Scullery
Mess-ment Toilet
Evaporators
Coal
Passage
Fire Room
Up-take
Boiler Room
Comdg. Offs. Qrs
Med Officers Mess & Qrs.
Library & Reception Room
Medical Surg.
Ventilating Machinery
Coal
Masters Qrs
Ele-vator Shaft
Pilot House
Main Operating Room
Eye Exam R.
Toilet
Wards
Built R
Convalescents Mess & Berthing Space
Medical
#2 Hold
Venereal Ward
Med & Surg
Berthing Space
Stores
Ship & Equipment
Stores
#1 Hold
Anchor Engines & Seamens Toilet
Seamens Qrs
Paint Locker
Stores
Chain Locker
Stores
Trimming Tank


Plans for a Hospital Ship
U S. Navy.
E.M.B.
Boat Deck.
28' Whale-boat
26' Cutter.
30' Motor Launch.
28' Cutter.
28' Cutter.
26' Motor Boat.
30' Sailing Launch
28' Cutter.
28' Cutter.
28' Whale-boat
Hatch
Engine Room Hatch
Fire Room Hatch
Pantry
Toilet
State R
Comdg. Off's Cabin
Masters Cabin
Pilot House.
Chart Room
Hatch
Hatch
Down
Up

a view to having the Medical Department fully prepared in case of war. The bureau did not consider that the present needs of the service required such a large vessel, and suggested that a ship of about 200 beds would be sufficient for some years to come, in time of peace. Besides, the expense of building so large a ship would be greater than it was thought advisable to ask for, and a smaller one was thought more advisable until the subject of hospital ships was more fully developed. Acting on these suggestions, the writer submitted plans in September, 1911, for a smaller ship of about 6,000 tons, 250 beds and extra berthing space for 150 more patients, making 400 besides the crew. It would not be advisable to have one of smaller size than this on account of the lack of space and stability that it would necessarily have. Stability in a ship is one of the greatest factors in the care, comfort, and treatment of patients on board, and every effort should be made to obtain it. These plans provide for a ship with very broad beam in proportion to its length, which will make her steady, comfortable, and roomy. She will be high out of the water, but all the heavy weights will be below, which will give her the required stability.

Length over all	feet	352
Length water line	do	340
Breadth molded	do	56
Depth molded	do	40
Draft water line	do	22
Displacement	tons	6,000
Complement:		
Naval		70
Auxiliary		115
Total		185
Beds for sick		250
Extra berthing space		150
Total		400
Triple expansion engines, indicated horsepower		6,000
Twin screws	diameter, feet	15
Speed	knots	12–16
Boilers, 6 Scotch:		
Length	feet	12
Diameter	do	14

Coal capacity, 1,500 tons.

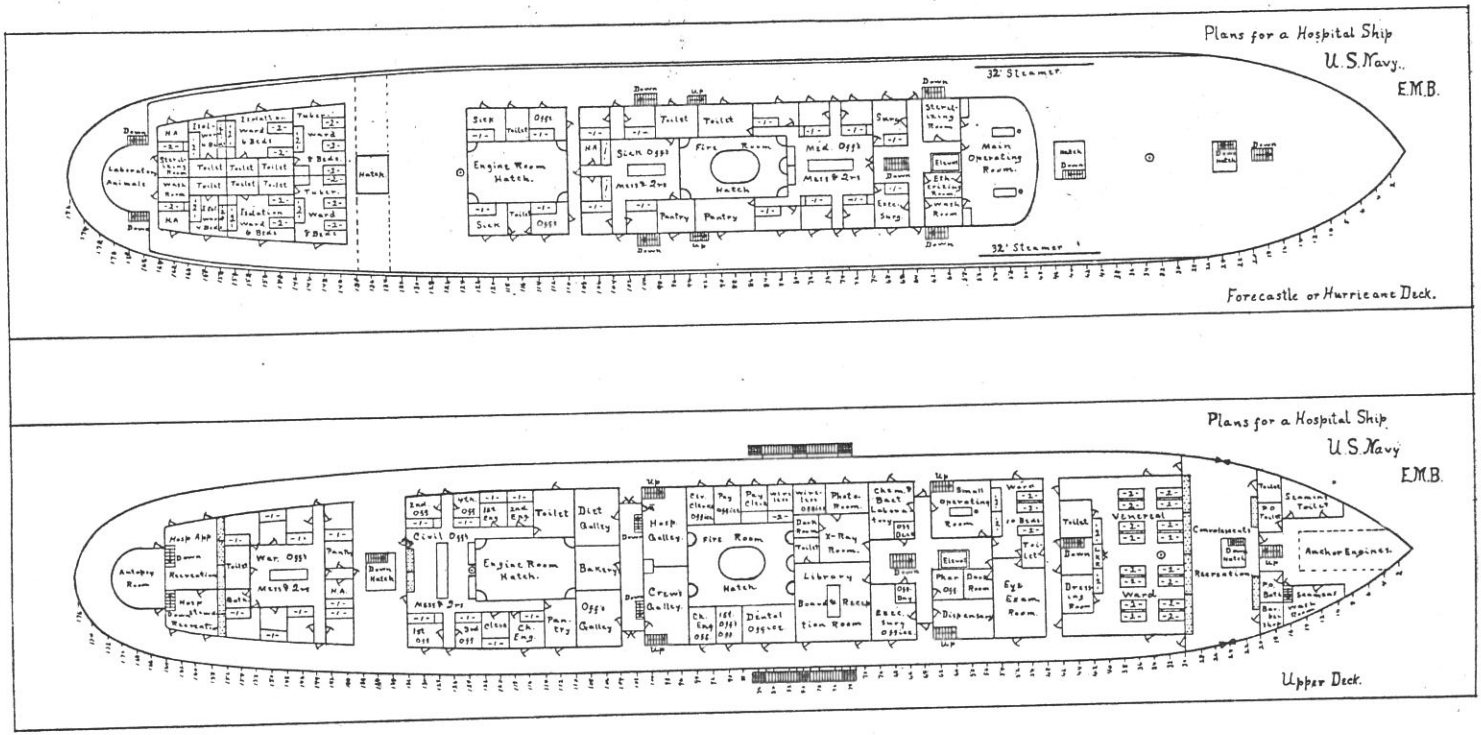
There are seven decks to this ship, including boat deck and hold, and a brief description of each is here given.

The BOAT DECK begins at frame 48 and runs aft to frame 123. On it is a deck house containing the pilot house, on top of which is the bridge; a chart room and navigator's storeroom; the master's quarters; and the commanding officer's quarters. The fresh-water gravity

tanks are on this deck, aft of the smokestack. There is a wide gangway around the deck house extending aft to the end of the deck. There are 10 large boats on this deck, with patent davits for hoisting and lowering, viz, 2 motor boats, 2 whaleboats, and 6 cutters. This deck is 34 feet above the water.

THE FORECASTLE AND HURRICANE DECK begins at the bow and extends aft to frame 170. It has a deck house beginning at frame 48 and ending at frame 123, in which are located the following compartments: The main operating room, with sterilizing, etherizing, and wash rooms attached; ward room, with 8 staterooms, pantry, and toilet for medical officers; sick officers' quarters, consisting of mess room and pantry, 10 staterooms, and 3 toilets. On the after part of this deck, between frames 139 and 164, a deck house containing the 6 isolation wards with a combined capacity of 52 beds, two rooms for nurses, and wash and sterilizing rooms. Each ward has its own toilet and is a separate unit in itself. Laboratory animals are kept aft of this deck house. The forecastle extends aft to the forward deck house and has two 32-foot steamers on the after part of it. It affords ample space for exercise and recreation for convalescent patients. A companionway and two large hatches with ladders in them lead down to the compartments below, making communication ample and easy. The hurricane deck runs along the sides and around the after part of the deck house and affords an excellent place for exercise and recreation for the ship's officers and sick officers. Communication is had with the decks above and below by stairways and ladders, and there is an elevator that leads from this deck clear through to the hold. There is a wide gangway around the isolation wards, so that contagious cases can get out on deck and get fresh air and sunlight. This deck is 26 feet above the water.

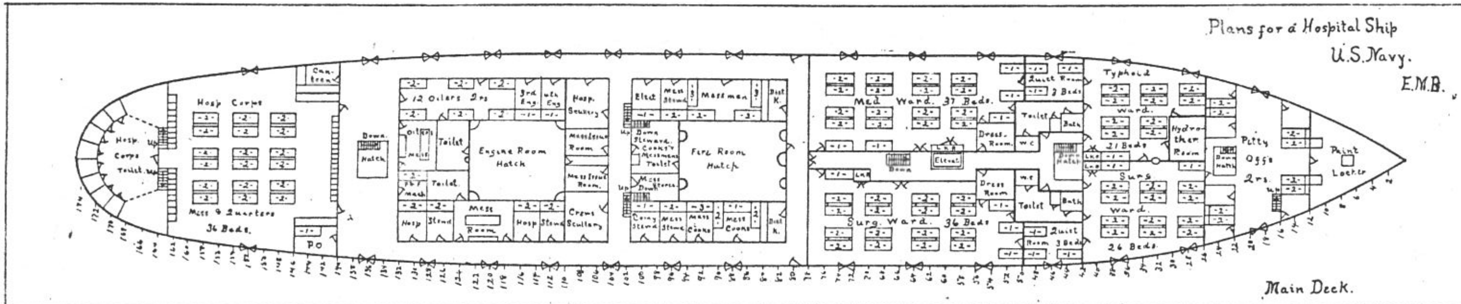
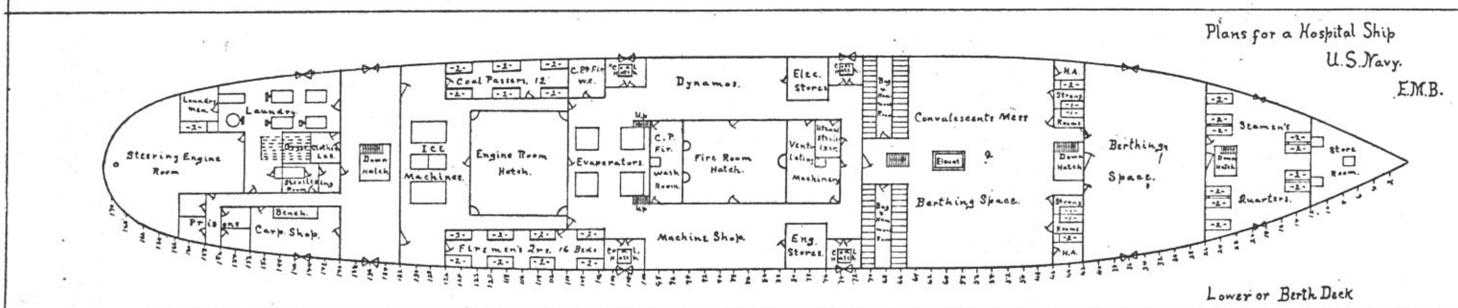
THE UPPER DECK extends the whole length of the ship. Forward are the anchor engines, ship's petty officers' and seamen's toilets and wash rooms, aft of which comes the convalescents' recreation room, with barber shop and toilet attached. Just aft of this room the sides of the ship are cut away from the forecastle deck down to this deck, and a 6-foot gangway runs down each side of the ship to and around the stern. From forward, aft, the following compartments are located on this deck, viz, a venereal ward of 40 beds with dressing room and toilet; an eye examining room with dark room, toilet, and small ward of 10 beds attached; dispensary; pharmacist's office and small operating room; offices for executive officer, officer of the day, and officer of the deck; bacteriological and chemical laboratories; X-ray and photographic rooms; library; board and reception room; dental, first officer, chief engineer, wireless, civil clerk, pay offices, wireless operators, and pay clerk's rooms. There are 4 galleys and a bakery, centrally located and very accessible to all parts of the ship, with


Plans for a Hospital Ship
U. S. Navy.
E.M.B.
32' Steamer
Forecastle or Hurricane Deck.
Plans for a Hospital Ship
U. S. Navy
E.M.B.
Upper Deck.

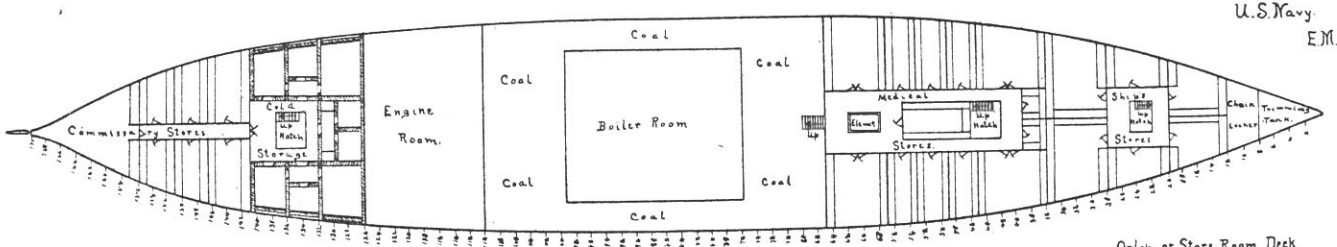
dumb-waiter and ladders leading below, where overhead food carriers will distribute food to the main wards and messes of the ship. The auxiliary officers' quarters, consisting of mess room, pantry, and toilet, and 8 staterooms, come aft of the galleys. Then comes a 14-foot athwartship passage with a large hatch in the center, aft of which come the sick quarters of the junior and warrant officers, consisting of mess room, pantry, toilet, and 9 staterooms. Aft of these are two recreation rooms for the hospital corps, aft of which is the autopsy room. This deck is 18 feet above the water.

THE MAIN DECK has storerooms forward, aft of which come the quarters of the ship's petty officers, aft of which, between frames 22 and 78, come the main wards of the ship. There are 2 medical and 2 surgical wards with dressing rooms and toilets attached, and also a hydrotherapeutic room. There are also 2 quiet rooms of 3 beds each. The total capacity of these wards is 136 beds. Just aft of the wards are 2 small diet kitchens where nurses can prepare special food and diets for patients at all hours. Between frames 78 and 140 around the fireroom and engine room uptakes are grouped the quarters of some of the engineer officers, hospital stewards, commissary and mess stewards, mess cooks and boys, machinists and oilers, with mess rooms, mess issue rooms, sculleries, toilet, and wash rooms. On the after part of this deck are the canteen, post office, hospital, apprentices' quarters, and toilet. There are 30 large, square ports on this deck besides smaller ports, which give excellent light and ventilation to the wards and other living spaces. This deck is 10 feet above the water.

THE LOWER OR BERTH DECK has a storeroom and seamen's quarters forward, aft of which, between frames 26 and 71, come 2 large berthing spaces capable of accommodating about 150 convalescent patients when it is necessary to crowd the ship to its fullest capacity. Strong rooms for the insane and two bag and hammock rooms open into the after one of these compartments. Between frames 71 and 110 around the fireroom hatch is most of the auxiliary machinery, utensil sterilizers for the wards, engineer and electrical storerooms, machine shop, dynamo room, evaporators, and firemen's and coal passers' wash room and toilet. There are 2 large cargo ports on each side of this space, which open into handling rooms, with large coaling hatches in them. These handling rooms have water-tight doors in the inner bulkheads, so that coaling can be done entirely in these rooms and practically outside of the ship. Between frames 110 and 132 on either side of the engine-room uptake are the firemen's and coal passers' quarters, and the refrigerating machinery is aft of it. The laundry, dry room, clothes locker, and laundrymen's quarters are on the port side in the after part of this deck, and the

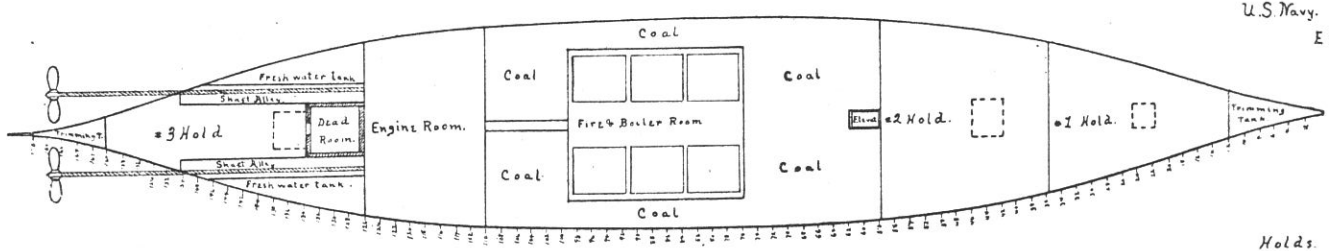

Plans for a Hospital Ship
U.S. Navy.
E.M.B.
Main Deck.
Hosp. Corps
Mess & Quarters
36 Beds.
Can-teen
PO
Down Hatch
12 Oilers Qrs
Engine Room Hatch
Hosp. Scullery
Crews Scullery
Toilet
Mess Room
Fire Room Hatch
Mess men
Med. Ward. 37 Beds.
Surg. Ward. 36 Beds.
Dress. Room
Toilet
Bath
Quiet Room 3 Beds
Typhoid Ward.
21 Beds
Hydro-ther Room
Surg. Ward.
26 Beds.
Petty Off's Qrs.
Paint Locker

Plans for a Hospital Ship
U.S. Navy.
E.M.B.
Lower or Berth Deck
Steering Engine Room
Laundry
Laundry men
Carp. Shop.
Bench.
Prisons
Down Hatch
Ice
Machines.
Coal Passers. 12
Engine Room Hatch.
Firemen's Qrs. 16 Beds
Evaporators.
Dynamos.
C.P. Fir. Wash Room.
Fire Room Hatch.
Machinery
Machine Shop.
Elec. Stores
Eng. Stores.
Convalescents Mess
Elevat.
Berthing Space.
H.A.
Down Hatch
Berthing Space.
Seamen's Quarters.
Store Room.

Plans for a Hospital Ship
U.S. Navy.
E.M.B.



Orlop or Store Room Deck

Plans for a Hospital Ship.
U.S. Navy.
E.M.B.



Holds.

carpenter shop and ship's prisons are on the starboard side. Between these are the main sterilizing and disinfecting rooms. The steering-engine room is in the extreme after part of this deck. This deck is 2 feet above the water.

THE ORLOP OR STOREROOM DECK has the ship's storerooms, forward, aft of which are the medical storerooms. These are accessible through large cargo hatches, which have ladders leading up and down. The elevator and a stairway also run down to the medical storerooms and hold. The upper parts of the coal bunkers, boiler room, and engine room are amidships, between frames 65 and 126. Aft of frame 126 come the cold-storage rooms, eight in all, and the commissary storerooms, seven in all. A large hatch with freight elevator and ladder runs down into this space, making the storerooms very accessible.

There are 3 holds, one forward for ship and equipment stores, aft of which is one for medical stores. Large cargo hatches lead down into these holds, and the elevator runs down to the one for medical stores. The coal bunkers, boiler room, and engine room occupy all the space between frames 58 and 126. The dead room comes aft of the engine room, and then comes the after hold for stowing coffins, lumber, and other heavy material. A large cargo hatch with freight elevator opens into this hold. There is a large fresh-water storage tank on the outboard side of each shaft alley.

Attention is called to the excellent means of communication between all parts of the ship. There are wide passages and gangways to facilitate communication between the various parts of the same deck and elevators, stairways, ladders, and hatches to facilitate communication between the different decks. None of the wards has to be used as a passageway or gangway to get from one part of the ship to another. A ward should never have to be used as a passageway or for any purpose other than caring for and treating the sick. The forward elevator and stairway adjacent to it extend from the boat deck down to the hold, passing from the commanding officer's quarters through the spaces occupied by the medical officers' quarters and operating rooms, the administrative, executive, and other offices, laboratories, dispensary, X-ray room, wards, berthing spaces, medical storerooms, and hold, giving excellent communication between all these compartments. The galleys are centrally located and are very convenient to all the principal messes. Movable cots should be installed, so that they could be put out of the way, or wards could be cleared of all those that are not in use or filled up with them when there is a big influx of patients. The writer has designed a cot, several of which are in use on the U. S. S. *Solace*, which meet these conditions admirably.

Conditions can never be ideal on board a hospital or other ship on account of the lack of space and consequent crowding and congestion, and things have to be adapted to meet conditions and circumstances as they exist. Sometimes good ventilation and sanitation will have to be sacrificed on account of convenience and lack of space, and vice versa. It will require excellent judgment to determine just what features should be sacrificed for other features, in order that the ship as a whole may be best adapted to the uses for which it is intended.